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ART UNIT	**PAPER NUMBER**
2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/691,424	KAPLAN ET AL.	
	Examiner	Art Unit	
	MICHAEL C. COLUCCI	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 December 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-7,10-17,25 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-7,10-17,25 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/15/2009 has been entered.

Response to Arguments

2. Applicant's arguments filed 12/15/2009 have been fully considered but they are not persuasive.

- Arguments with respect to the most recent amendments (page 9 paragraph 1, page 10 paragraphs 2 and 4).

Examiner believes that the amendments made to claims 1, 6, and 11 narrow the scope of the present invention to further define “code points” with respect to a plurality of linguistic symbols used in a plurality of languages. However, Examiner maintains the use of the cited prior art, particularly Okada and Edberg improving the teachings of Lisle, to address the amendments in claims 1, 6, and 11.

Examiner looks to the specification for support of the amendments and to understand how "code points" are used with respect to a plurality of languages. Please consider support for code points and Unicode stemming from the present invention, such as:

"*To facilitate the binary search operation, the entries in each compression table are sorted during the build process according to the combined Unicode values of the compressions, and the binary search method is based on the combined Unicode values. By way of example, in the compression tables for Hungarian as shown in FIG. 5, the compression "ly" is represented by the code point combination of "0x006c 0x0079", while the compression "ny" is represented by the code point combination of "0x006e 0x0079". As a result, "ny" is listed in the 2-to-1 compression table after "cy". During 16 the search operation, when a compression table is to be searched, the highest and lowest code points of the entries in the table are retrieved, and the binary search technique is applied to quickly determine whether a match with a combination of symbols in the input string is found in the compressions in the table.*" (present invention spec.[0028]).

Additionally, Examiner finds support for the manner in which linguistic symbols are analyzed in a fundamental way, and maintains Edberg in view of the following support:

"*A fundamental operation on textual strings consisting of symbols of a given language is collation, which may be defined as sorting the strings according to an ordering of the symbols that is culturally correct to users of that particular language.*

Anytime a user orders linguistic data or searches for linguistic data in a logical fashion within the structure of the given language, collation is used. Collation is a rather complex matter and requires an in-depth understanding of the language. For example, in English, a speaker expects a word starting with the letter "Q" to sort after all words beginning with the letter "P" and before all words starting with the letter "R". As another example, in the Chinese language used in Taiwan, the Chinese block characters are often sorted according to their pronunciations based on the "bopomofo" phonetic system as well as the numbers of strokes in the characters. The proper sorting of the symbols also has to take into account variations on the symbols. <u>Common examples of such variations include the casing (upper or lower) of the symbols and modifiers (diacritics, Indic matras, vowel marks) applied to the symbols.</u>" (present invention spec.[0003]).

Examiner finds Edberg 5,873,111 A (hereinafter Edberg) to teach code points in a Unicode having various languages handling various symbols in a specific order. For instance, please consider that Edberg teaches that if the prefix ordering does not determine the proper collation order, then the corresponding table object 44 (shown in FIG. 4) is searched in step 218. The corresponding table object 44 tells the string collation manager 28 where to locate the desired information. For example, ***if both the characters being compared are Latin letters under the Unicode encoding 32c category, then the table object 44 indicates collation table 22C to obtain the desired information which may be the collation order and text element information. Text element information determines whether an "l" should be***

collated as a complete text element or whether it needs to be collated as "ll" because the collation order required may be the Spanish collation order in which "ll" can be a complete text element (see Background discussion regarding issues with different languages). This kind of information such as collation order and text element information is retrieved from the table object in step 220 (Edberg Col. 16 lines 38-54).

Further, Edberg teaches that if it is determined whether there are other levels of significance such as secondary or tertiary differences in step 114. As previously discussed, ***an example of secondary or tertiary differences are lower case verses upper case, or "a" verses "a"***. If there are differences in other levels of significance, then the collation result is to have the most significant difference determine the sorting order in step 120. This kind of information regarding different levels of significance can be obtained through, but are not limited to, any of the following: ***the collation tables 22, engines 26, the ordering of character attributes 46, or the prefix 43 order. The collation tables 22, engines 26, the ordering of the character attributes 46, and/or the prefix 43 order can also determine particular collation order such as dictionary order, index order, bibliography order, or a custom collation order. These orders may be determined by an ordering identification which allows the system to compare the values of one character to another. For example, the Latin letter a may have a smaller identification than the letter b to allow the system to compare a<b, therefore, a is sorted before b.*** (Edberg Col. 15 lines 19-39).

Edberg also specifically states that present invention is a system and method of organizing information in a processing system for collation of distinct sets of information such as strings of text according to the rules of various languages. It ***uses table formats for organizing information to obtain a result which is an intersection of different sets of information (character attributes), where an intersection is the set containing all the information common to two or more character attributes.*** (Edberg Col. 7 lines 25-34). Examiner finds this alone to read upon the scope of the present invention with respect to a plurality of languages and symbols.

Edberg also teaches overcoming well known uses of multilingual text analysis and searching, such as ***code sets and encoding methods each supporting one language or a group of related languages***. However, this method will be insufficient if the need for the blend of languages is more exotic. For example, the combination of French and Arabic--a common mix in Northern Africa--is a problem because one requires ISO 8859-1 (Latin-1), while the other requires ISO 8859-6. A partial solution has been an effort to combine all characters into a universal code set. The idea of a universal set is to combine every character for all commonly used scripts and languages, as well as all the symbols one would need, in one large code set called Unicode. (Edberg Col. 2 lines 7-18).

Edberg address these shortcomings through an improved Unicode routine, wherein Edberg teaches that what is needed is a system and method for accurate and efficient collation for distinct sets of information in a processing system. More particularly, what is needed is a system and method for accurate and efficient collation

for a wide variety of languages. The present invention addresses such a need. (Edberg Col. 6 lines 10-27).

Examiner finds Figures 4 and 5 of EDBERG (see below) to read upon Figure 3 of the PRESENT INVENTION directly below:

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Default Table (excerpt)

Code Point	SM	AW	DW	CW	Comments
0x0308	1	0	17	0	;Non-Spacing Diaeresis
0x0300	1	0	13	0	;Non-Spacing Grave Accent
0x0061	14	2	2	2	;Latin Small Letter A
0x00e4	14	2	19	2	;Latin Small Letter A Diaeresis
0x0041	14	2	2	18	;Latin Capital Letter A
0x00c4	14	2	19	18	;Latin Capital Letter A Diaeresis
0x0042	14	9	2	18	;Latin Capital Letter B
0x00f6	14	124	19	2	;Latin Small Letter O Diaeresis
0x00d6	14	124	19	18	;Latin Capital Letter O Diaeresis
0x005a	14	169	2	18	;Latin Capital Letter Z
0x03b4	15	5	2	2	;Greek Small Delta
0x03b5	15	6	2	2	;Greek Small Epsilon
0x03ad	15	6	5	2	;Greek Small Epsilon Tonos
0x0395	15	6	2	18	;Greek Capital Epsilon
0x0388	15	6	5	18	;Greek Capital Epsilon Tonos

FIG. 3

Present invention

Further, consider Figure 4 of Edberg representing the analysis of various languages and attributes (such as symbols):

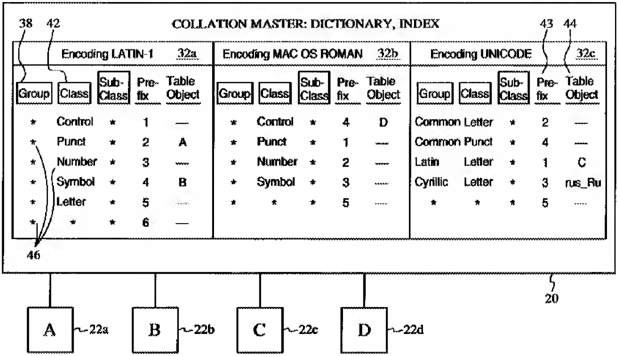


FIG. 4

Similarly Figure 5 of Edberg:

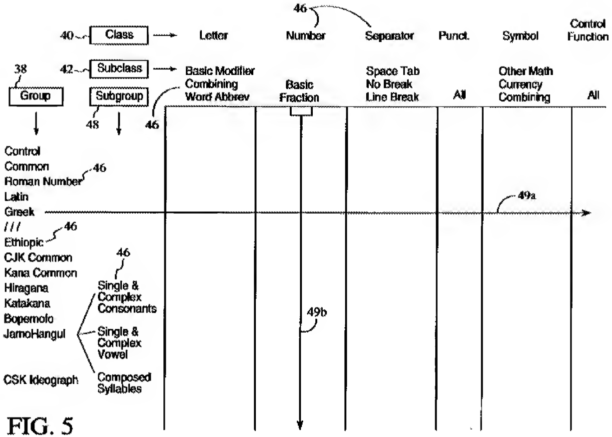


FIG. 5

Additionally, Examiner would like to cite that which was previously recited:

NOTE: *Lisle alone explicitly teaches a collation order assumed for the example of FIG. 2 is that used in the IBM System/370 computer architecture. This is an* <u>*assigned hierarchical sorting collation order*</u> *with special characters first in a defined order that is known to users of such systems, followed by the alphabet upper and lower case and last, by the numerals in the* <u>*highest collation order of sequence*</u>*. The collation order may be viewed as equivalent to an overall "alphabetic order" for the possible entries to be sorted. The actual dictionary entries for each dictionary are thus collated*

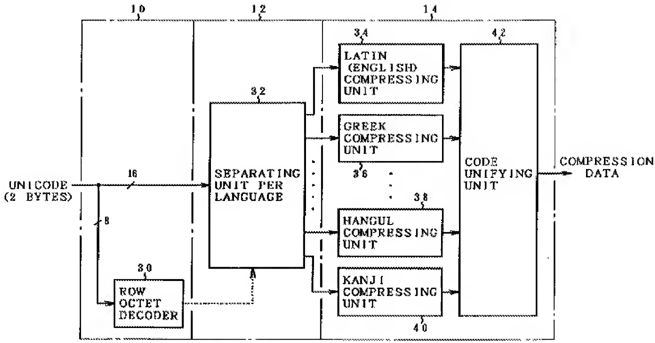
first and sorted into the collation order. Each dictionary segment thus begins with some low collation order entry of a given length and a given entry word (or number or character as the case may be) and the segment index ends with the highest collation order entry that appears within that segment of the dictionary being used. The dictionary segment index is used to speed dictionary search time using binary search techniques as will be described (Col. 15 lines 23-63 & Fig. 2).

Further, Examiner believes that Okada teaches compression sorting and can easily be combined with the teachings of Edberg, since Edberg already teaches a multilingual, Unicode, and attribute based text analysis. Examiner believes that Edberg would be used to further refine the teachings of Okada through the use of a multilingual Unicode structure.

As previously cited, Okada improves the teachings of Lisle in view of Katayama, wherein Okada teaches discriminating the kind of language, wherein a separating unit 32 per language is provided for the language string separating unit 12. On the basis of the discrimination result of the language by the row octet decoder 30, the separating unit 32 per language separates the input Unicode data into each language string such as Latin (English), Greek, or the like. A compressing unit corresponding to each language allocated for the Unicode is individually provided for the language string compressing unit 14. In the embodiment, a Latin compressing unit 34, a Greek compressing unit 36, a Hangul compressing unit 38, a Kanji compressing unit 40, and the like are provided. As a compressing unit per language which is provided for the language string compressing unit 14, it is sufficient to properly decide the compressing

unit in accordance with the language which is treated in the Unicode source data as a compression target. The compression data per language compressed by each of the Latin compressing unit 34, Greek compressing unit 36, Hangul compressing unit 38, and Kanji compressing unit 40 is unified by a code unifying unit 42 and the unified data is outputted as compression data. As a compressing method of each compressing unit per language provided for the language string compressing unit 14, a plurality of dictionary memories corresponding to the languages are provided and there is executed a Ziv-Lempel encoding for encoding by a longest coincidence retrieval of the character string which is inputted per data of the language string and the character string which has already been registered in the dictionary for every language. In the Ziv-Lempel encoding, any one of the dynamic dictionary method and the slide dictionary method can be used. As another compressing method, for the character string separated every language, on the basis of a probability table per language string obtained until now, the character string which is inputted every data can be also multi-value arithmetic encoded. The source data of the Unicode in which different languages mixed exist is separated every language and is individually compressed, so that the compression of each character string in which statistic natures are similar is executed. A compressing function in the Ziv-Lempel encoding, arithmetic encoding, or the like is effectively used and a high compression ratio can be realized (Okada Col. 12 line 26 –Col. 13 line 8 & Fig. 17 and 18 compression, decompression).

F I G. 1 7



Okada

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1, 2, 5-7, 10-12, 15-17, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lisle et al US 4,843,389 (hereinafter Lisle) in view of Katayama et al. US 6260051 B1 US 5550541 A (hereinafter Katayama) and further in view of

Okada US 5889481 A (hereinafter Okada) and Edberg 5,873,111 A (hereinafter Edberg).

Re claims 1 and 6, Lisle teaches a computer-readable medium having computer-executable instructions for performing a method for building a symbol table for storing sort weights for a plurality of linguistic symbols used in a plurality of languages supported by a computer system (Col. 15 lines 45-63), the method comprising:

constructing the symbol table (Col. 19 lines 36-59) to contain a list of code points (Col. 20 lines 35-56)

providing a plurality of compression tables, each compression table pertaining to one of the supported languages and having a compression type and containing compressions of symbols of that compression type

for each code point in the symbol table (Col. 20 lines 35-56), sorting the compression tables using a processor of the computer,(Col. 19 lines 36-59) to identify a highest compression type our compressions beginning with the symbol (Col. 15 lines 45-63) identified by said each code point (Col. 20 lines 35-56);

storing in the symbol table a tag for the code point to indicate said highest compression type for the code point (Col. 20 lines 35-56).

wherein the tag for each code point is stored as a portion of the sort weight of the symbol identified by said each code point, and wherein the sort weight of the symbol identified by said each code point comprises a case weight value (Col. 15 lines 45-63), and wherein the tag for said each code point is stored as part of the case weight value for said each code point (Col. 20 lines 35-56)

NOTE: Tagging a code point is construed to be both functionally equivalent and equally effective as ranking or ordering a code point or address in memory for the purposes of a hierarchical classification.

However, Lisle fails to teach each compression being a grouping of two or more symbols treated as a single unit for purposes of linguistic sorting and the compression type identifying a number of symbols in a given compression in the compression table

Katayama teaches a registration two-character chain table producing unit 194 for producing a first table block, in which a plurality of registration first and second two-character chains respectively including the same type of for general character and the position numbers of the registration first and second two-character chains are listed in the order of arranging the chains in the converted registration character string, for each fore general character type, producing a second table block, in which a plurality of registration special two-character chains respectively including the same type of fore symbolic character and the position numbers of the registration special two-character chains are listed in the order of arranging the chains in the converted registration character string, for each fore symbolic character type, and combining each first table block corresponding to one type of fore general character and one second table block corresponding to one type of fore symbolic character determined in correspondence to the type of the fore general character to form a two-character chain table for each character group, the fore characters of the chains in each two-character chain table belonging to the same character group (Katayama Col. 130 lines 33-53).

Further, Katayama teaches a character chain collating and judging unit 200 for receiving the position numbers of one particular two-character chain Tc1 from the storing unit 195 just after the reception of the position numbers of another particular two-character chain Tc2 under the control of the control unit 199. (First collation case), collating each position number of a particular second two-character chain Tc1 with a particular position number of a particular first two-character chain Tc2 to judge whether or not each position number of the particular second two-character chain Tc1 agrees with the particular position number of the particular first two-character chain Tc2 (second collation case), collating each position number of a particular special two-character chain Tc1 with a particular position number of a particular first two-character chain Tc2 to judge whether or not each position number of the particular special two-character chain Tc1 is higher than the particular position number of the particular first two-character chain Tc2 by one (third collation case), collating each position number of a particular special two-character chain Tc1 with a particular position number of a particular second two-character chain Tc2 to judge whether or not each position number of the particular special two-character chain Tc1 is higher than the particular position number of the particular second two-character chain Tc2 by two (fourth collation case), collating each position number of a particular first two-character chain Tc1 with a particular position number of a particular special two-character chain Tc2 to judge whether or not each position number of the particular first two-character chain Tc1 is higher than the particular position number of the particular special two-character chain Tc2 by one (fifth collation case), and detecting a particular position number of a

particular two-character chain of the particular two-character chain table Tc1 for each collation case (Katayama Col. 131 lines 27-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lisle to incorporate compression being a grouping of two or more symbols treated as a single unit for purposes of linguistic sorting and the compression type identifying a number of symbols in a given compression as taught by Katayama to allow for control of several letters/symbols within a character chain, wherein a table is used to track, judge, and find the position and number of symbols present (Katayama Col. 130 lines 33-53).

However, Lisle in view of Katayama fails to teach

providing a plurality of compression tables, each compression table pertaining to *one of the supported languages* and having a compression type and containing compressions of symbols of that compression type

linguistic sorting determined based on a compression type of the given compression, a first of the two or more symbols in the given compression and a predefined order of symbols

Okada teaches discriminating the kind of language, wherein a separating unit 32 per language is provided for the language string separating unit 12. On the basis of the discrimination result of the language by the row octet decoder 30, the separating unit 32 per language separates the input Unicode data into each language string such as Latin (English), Greek, or the like. A compressing unit corresponding to each language

allocated for the Unicode is individually provided for the language string compressing unit 14. In the embodiment, a Latin compressing unit 34, a Greek compressing unit 36, a Hangul compressing unit 38, a Kanji compressing unit 40, and the like are provided. As a compressing unit per language which is provided for the language string compressing unit 14, it is sufficient to properly decide the compressing unit in accordance with the language which is treated in the Unicode source data as a compression target. The compression data per language compressed by each of the Latin compressing unit 34, Greek compressing unit 36, Hangul compressing unit 38, and Kanji compressing unit 40 is unified by a code unifying unit 42 and the unified data is outputted as compression data. As a compressing method of each compressing unit per language provided for the language string compressing unit 14, a plurality of dictionary memories corresponding to the languages are provided and there is executed a Ziv-Lempel encoding for encoding by a longest coincidence retrieval of the character string which is inputted per data of the language string and the character string which has already been registered in the dictionary for every language. In the Ziv-Lempel encoding, any one of the dynamic dictionary method and the slide dictionary method can be used. As another compressing method, for the character string separated every language, on the basis of a probability table per language string obtained until now, the character string which is inputted every data can be also multi-value arithmetic encoded. The source data of the Unicode in which different languages mixed exist is separated every language and is individually compressed, so that the compression of each character string in which statistic natures are similar is executed. A compressing

unction in the Ziv-Lempel encoding, arithmetic encoding, or the like is effectively used and a high compression ratio can be realized (Okada Col. 12 line 26 –Col. 13 line 8 & Fig. 17 and 18 compression, decompression).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lisle in view of Katayama to incorporate providing a plurality of compression tables, each compression table pertaining to one of the supported languages and having a compression type and containing compressions of symbols of that compression type and linguistic sorting determined based on a compression type of the given compression, a first of the two or more symbols in the given compression and a predefined order of symbols as taught by Okada to allow for the distinguishing between multiple languages mixed or separately in a Unicode environment dealing with compression, decompression, and sorting to create a high compression ratio/type depending on the language (i.e. grammar), wherein compression ratios vary for each language in reference to a already existing language (Okada Col. 12 line 26 –Col. 13 line 8 & Fig. 17 and 18 compression, decompression).

However, Lisle, in view of Katayama and Okada fails to teach a tag associated with a code point

code points for a plurality of linguistic symbols used in a plurality of language, each code point uniquely identifying one of the plurality of linguistic symbols, wherein the symbol table includes a sort weight for each of the plurality of symbols identified by the list of code points.

Examiner finds Edberg teaches code points in a Unicode having various languages handling various symbols in a specific order. For instance, please consider that Edberg teaches that if the prefix ordering does not determine the proper collation order, then the corresponding table object 44 (shown in FIG. 4) is searched in step 218. The corresponding table object 44 tells the string collation manager 28 where to locate the desired information. For example, if both the characters being compared are Latin letters under the Unicode encoding 32c category, then the table object 44 indicates collation table 22C to obtain the desired information which may be the collation order and text element information. Text element information determines whether an "l" should be collated as a complete text element or whether it needs to be collated as "ll" because the collation order required may be the Spanish collation order in which "ll" can be a complete text element (see Background discussion regarding issues with different languages). This kind of information such as collation order and text element information is retrieved from the table object in step 220 (Edberg Col. 16 lines 38-54 $ Fig, 4 and 5).

Further, Edberg teaches that if it is determined whether there are other levels of significance such as secondary or tertiary differences in step 114. As previously discussed, an example of secondary or tertiary differences are lower case verses upper case, or "a" verses "a". If there are differences in other levels of significance, then the collation result is to have the most significant difference determine the sorting order in step 120. This kind of information regarding different levels of significance can be obtained through, but are not limited to, any of the following: the collation tables 22,

engines 26, the ordering of character attributes 46, or the prefix 43 order. The collation tables 22, engines 26, the ordering of the character attributes 46, and/or the prefix 43 order can also determine particular collation order such as dictionary order, index order, bibliography order, or a custom collation order. These orders may be determined by an ordering identification which allows the system to compare the values of one character to another. For example, the Latin letter a may have a smaller identification than the letter b to allow the system to compare a<b, therefore, a is sorted before b. (Edberg Col. 15 lines 19-39).

Edberg also specifically states that present invention is a system and method of organizing information in a processing system for collation of distinct sets of information such as strings of text according to the rules of various languages. It uses table formats for organizing information to obtain a result which is an intersection of different sets of information (character attributes), where an intersection is the set containing all the information common to two or more character attributes. (Edberg Col. 7 lines 25-34). Examiner finds this alone to read upon the scope of the present invention with respect to a plurality of languages and symbols.

Edberg also teaches overcoming well known uses of multilingual text analysis and searching, such as code sets and encoding methods each supporting one language or a group of related languages. However, this method will be insufficient if the need for the blend of languages is more exotic. For example, the combination of French and Arabic--a common mix in Northern Africa--is a problem because one requires ISO 8859-1 (Latin-1), while the other requires ISO 8859-6. A partial solution has been an effort to

combine all characters into a universal code set. The idea of a universal set is to combine every character for all commonly used scripts and languages, as well as all the symbols one would need, in one large code set called Unicode. (Edberg Col. 2 lines 7-18).

Edberg address these shortcomings through an improved Unicode routine, wherein Edberg teaches that what is needed is a system and method for accurate and efficient collation for distinct sets of information in a processing system. More particularly, what is needed is a system and method for accurate and efficient collation for a wide variety of languages. The present invention addresses such a need. (Edberg Col. 6 lines 10-27).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lisle in view of Katayama and Okada to incorporate a tag for each code point is stored as a portion of the sort weight of the symbol identified by said each code point, and wherein the sort weight of the symbol identified by said each code point comprises a case weight value and wherein the tag for said each code point is stored as part of the case weight value for said each code point as taught by Edberg to allow for proper ordering and collation of characters, wherein prefixes are considered in a language specific text (i.e. Unicode and/or Latin), and are tagged with a grammatical element such as prefix as part of a collation order (Edberg Col. 12 lines 7-12).

Re claims 11, 16, 25, and 26 Lisle teaches a computer-readable medium having computer-executable instructions for performing a computer search program to carry out a linguistic sorting operation (Col. 15 lines 45-63, comprising:

receiving an input string containing a plurality linguistic symbols (Col. 6 lines 42-58) used in a given language (Col. 15 lines 45-63);

for a first symbol in a combination of symbols in the input string (Col. 15 lines 45-63), referencing a symbol table (Col. 20 lines 35-56) to obtain a highest compression type for compressions beginning with said first symbol, the symbol table having a list of code points each uniquely identifying a symbol and a sort weight for the symbol identified by said each code point;

performing a binary search (Col. 16 lines 6-27) through each of a plurality of compression tables (Col. 19 lines 36-59) containing compressions for the given language to find a matching compression that matches said combination of symbols in the input string (Col. 16 lines 6-27), wherein the plurality of compression tables are searched in a descending order (Col. 15 lines 45-63) of compression types of the compression tables (Col. 19 lines 36-59) starting with a compression table having a compression type equal to said highest compression type for said first symbol (Col. 15 lines 45-63).

NOTE: Tagging a code point is construed to be both functionally equivalent and equally effective as ranking or ordering a code point or address in memory for the purposes of a hierarchical classification.

NOTE: *Lisle alone explicitly teaches a collation order assumed for the example of FIG. 2 is that used in the IBM System/370 computer architecture. This is an <u>assigned hierarchical sorting collation order</u> with special characters first in a defined order that is known to users of such systems, followed by the alphabet upper and lower case and last, by the numerals in the <u>highest collation order of sequence</u>. The collation order may be viewed as equivalent to an overall "alphabetic order" for the possible entries to be sorted. The actual dictionary entries for each dictionary are thus collated first and sorted into the collation order. Each dictionary segment thus begins with some low collation order entry of a given length and a given entry word (or number or character as the case may be) and the segment index ends with the <u>highest collation order entry that appears within that segment of the dictionary being used</u>. The dictionary <u>segment index is used to speed dictionary search time</u> using binary search techniques as will be described (Col. 15 lines 23-63 & Fig. 2).*

However, Lisle fails to teach each compression being a grouping of two or more symbols treated as a single unit for purposes of linguistic sorting and the compression type identifying a number of symbols in a given compression

Katayama teaches a registration two-character chain table producing unit 194 for producing a first table block, in which a plurality of registration first and second two-character chains respectively including the same type of for general character and the position numbers of the registration first and second two-character chains are listed in the order of arranging the chains in the converted registration character string, for each

fore general character type, producing a second table block, in which a plurality of registration special two-character chains respectively including the same type of fore symbolic character and the position numbers of the registration special two-character chains are listed in the order of arranging the chains in the converted registration character string, for each fore symbolic character type, and combining each first table block corresponding to one type of fore general character and one second table block corresponding to one type of fore symbolic character determined in correspondence to the type of the fore general character to form a two-character chain table for each character group, the fore characters of the chains in each two-character chain table belonging to the same character group (Katayama Col. 130 lines 33-53).

Further, Katayama teaches a character chain collating and judging unit 200 for receiving the position numbers of one particular two-character chain Tc1 from the storing unit 195 just after the reception of the position numbers of another particular two-character chain Tc2 under the control of the control unit 199. (First collation case), collating each position number of a particular second two-character chain Tc1 with a particular position number of a particular first two-character chain Tc2 to judge whether or not each position number of the particular second two-character chain Tc1 agrees with the particular position number of the particular first two-character chain Tc2 (second collation case), collating each position number of a particular special two-character chain Tc1 with a particular position number of a particular first two-character chain Tc2 to judge whether or not each position number of the particular special two-character chain Tc1 is higher than the particular position number of the particular first

two-character chain Tc2 by one (third collation case), collating each position number of a particular special two-character chain Tc1 with a particular position number of a particular second two-character chain Tc2 to judge whether or not each position number of the particular special two-character chain Tc1 is higher than the particular position number of the particular second two-character chain Tc2 by two (fourth collation case), collating each position number of a particular first two-character chain Tc1 with a particular position number of a particular special two-character chain Tc2 to judge whether or not each position number of the particular first two-character chain Tc1 is higher than the particular position number of the particular special two-character chain Tc2 by one (fifth collation case), and detecting a particular position number of a particular two-character chain of the particular two-character chain table Tc1 for each collation case (Katayama Col. 131 lines 27-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lisle to incorporate compression being a grouping of two or more symbols treated as a single unit for purposes of linguistic sorting and the compression type identifying a number of symbols in a given compression as taught by Katayama to allow for control of several letters/symbols within a character chain, wherein a table is used to track, judge, and find the position and number of symbols present (Katayama Col. 130 lines 33-53).

However, Lisle in view of Katayama fails to teach a highest compression type for compressions in the compression tables beginning with said first symbol identified by

the code point, wherein the identified highest compression type indicates the highest compression type, for the code point in the plurality of compression tables for the plurality of languages

wherein the highest compression type indicates the highest compression type for all compressions in a plurality of compression tables relating to plurality of languages

the symbol table having a list of code points each uniquely identifying a symbol and a sort weight for the symbol identified by said each code point for a given language.

Okada teaches discriminating the kind of language, wherein a separating unit 32 per language is provided for the language string separating unit 12. On the basis of the discrimination result of the language by the row octet decoder 30, the separating unit 32 per language separates the input Unicode data into each language string such as Latin (English), Greek, or the like. A compressing unit corresponding to each language allocated for the Unicode is individually provided for the language string compressing unit 14. In the embodiment, a Latin compressing unit 34, a Greek compressing unit 36, a Hangul compressing unit 38, a Kanji compressing unit 40, and the like are provided. As a compressing unit per language which is provided for the language string compressing unit 14, it is sufficient to properly decide the compressing unit in accordance with the language which is treated in the Unicode source data as a compression target. The compression data per language compressed by each of the Latin compressing unit 34, Greek compressing unit 36, Hangul compressing unit 38, and Kanji compressing unit 40 is unified by a code unifying unit 42 and the unified data is outputted as compression data. As a compressing method of each compressing unit

per language provided for the language string compressing unit 14, a plurality of dictionary memories corresponding to the languages are provided and there is executed a Ziv-Lempel encoding for encoding by a longest coincidence retrieval of the character string which is inputted per data of the language string and the character string which has already been registered in the dictionary for every language. In the Ziv-Lempel encoding, any one of the dynamic dictionary method and the slide dictionary method can be used. As another compressing method, for the character string separated every language, on the basis of a probability table per language string obtained until now, the character string which is inputted every data can be also multi-value arithmetic encoded. The source data of the Unicode in which different languages mixed exist is separated every language and is individually compressed, so that the compression of each character string in which statistic natures are similar is executed. A compressing unction in the Ziv-Lempel encoding, arithmetic encoding, or the like is effectively used and a high compression ratio can be realized (Okada Col. 12 line 26 –Col. 13 line 8 & Fig. 17 and 18 compression, decompression).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lisle in view of Katayama to incorporate a highest compression type for compressions in the compression tables beginning with said first symbol identified by the code point, wherein the identified highest compression type indicates the highest compression type, for the code point in the plurality of compression tables for the plurality of languages, wherein the highest compression type indicates the highest compression type for all compressions in a plurality of

compression tables relating to plurality of languages, the symbol table having a list of code points each uniquely identifying a symbol and a sort weight for the symbol identified by said each code point for a given language as taught by Okada to allow for the distinguishing between multiple languages mixed or separately in a Unicode environment dealing with compression, decompression, and sorting to create a high compression ratio/type depending on the language (i.e. grammar), wherein compression ratios vary for each language in reference to a already existing language (Okada Col. 12 line 26 –Col. 13 line 8 & Fig. 17 and 18 compression, decompression).

Re claim 12, Lisle teaches a computer-readable medium as in claim 11, wherein the compressions in each of the compression tables (Col. 19 lines 36-59) are sorted according to code points for symbols forming the compressions (Col. 15 lines 45-63).

Re claim 2, 7, and 15, Lisle in view of Katayama fails to teach the computer-readable medium as in claim 1, wherein the code points are assigned to the symbols according to the Unicode standard.

Okada teaches discriminating the kind of language, wherein a separating unit 32 per language is provided for the language string separating unit 12. On the basis of the discrimination result of the language by the row octet decoder 30, the separating unit 32 per language separates the input Unicode data into each language string such as Latin (English), Greek, or the like. A compressing unit corresponding to each language allocated for the Unicode is individually provided for the language string compressing

unit 14. In the embodiment, a Latin compressing unit 34, a Greek compressing unit 36, a Hangul compressing unit 38, a Kanji compressing unit 40, and the like are provided. As a compressing unit per language which is provided for the language string compressing unit 14, it is sufficient to properly decide the compressing unit in accordance with the language which is treated in the Unicode source data as a compression target. The compression data per language compressed by each of the Latin compressing unit 34, Greek compressing unit 36, Hangul compressing unit 38, and Kanji compressing unit 40 is unified by a code unifying unit 42 and the unified data is outputted as compression data. As a compressing method of each compressing unit per language provided for the language string compressing unit 14, a plurality of dictionary memories corresponding to the languages are provided and there is executed a Ziv-Lempel encoding for encoding by a longest coincidence retrieval of the character string which is inputted per data of the language string and the character string which has already been registered in the dictionary for every language. In the Ziv-Lempel encoding, any one of the dynamic dictionary method and the slide dictionary method can be used. As another compressing method, for the character string separated every language, on the basis of a probability table per language string obtained until now, the character string which is inputted every data can be also multi-value arithmetic encoded. The source data of the Unicode in which different languages mixed exist is separated every language and is individually compressed, so that the compression of each character string in which statistic natures are similar is executed. A compressing unction in the Ziv-Lempel encoding, arithmetic encoding, or the like is effectively used

and a high compression ratio can be realized (Okada Col. 12 line 26 –Col. 13 line 8 & Fig. 17 and 18 compression, decompression).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lisle in view of Katayama to incorporate a Unicode standard for assigning code points to symbols as taught by Okada to allow for the distinguishing between multiple languages mixed or separately in a Unicode environment dealing with compression, decompression, and sorting to create a high compression ratio/type depending on the language (i.e. grammar), wherein compression ratios vary for each language in reference to a already existing language (Okada Col. 12 line 26 –Col. 13 line 8 & Fig. 17 and 18 compression, decompression).

Re claim 17, Lisle teaches the computer-readable medium as in claim 11, having further computer-executable instructions for storing a sort weight (Col. 15 lines 45-63) for the matching compression (Col. 16 lines 6-27).

Re claims 5 and 10, Lisle teaches the computer-readable medium as in claim 1, further comprising computer-executable instructions for performing steps of sorting compressions (Col. 15 lines 45-63) in each of the compression tables based on combinations of code points (Col. 20 lines 35-56) of the compressions in said each compression table (Col. 19 lines 36-59).

Re claim 13, Lisle teaches computer-readable medium as in claim 12, wherein each code point in the symbol table includes a tag indicating a highest compression type (Col. 19 lines 36-59) for said each code point (Col. 20 lines 35-56), and wherein said step of referencing retrieves the tag for the code point identifying said first symbol (Col. 15 lines 45-63).

Re claim 14, Lisle teaches sort weight of the symbol (Col. 15 lines 45-63) identified by said each code point (Col. 20 lines 35-56).

However Lisle in view of Katayama and Okada fails to teach the computer-readable medium as in claim 1, wherein the tag for each code point is stored as a portion

Edberg teaches character attributes that may be organized in a particular collation order such that information located earlier in the list indicate a higher priority level of significance. For example, if "number" comes before "letter" in the order of the character attributes in class 40, then any number will be collated before any letter, such that "10" will be listed before "apple" in a list of information which has been collated by the sample ordering of category 32a. Alternatively, the character attributes 46 may be tagged with a prefix 43. The lower the prefix 43 of a character attribute 46, the earlier it places in the collation order. For example, in the Unicode category 32c, Latin letters would list before Cyrillic letters in a collation order (Edberg Col. 12 lines 7-12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lisle in view of Katayama and Okada to

incorporate the tag for each code point stored as a portion as taught by Edberg to allow for proper ordering and collation of characters, wherein prefixes are considered in a language specific text (i.e. Unicode and/or Latin) (Edberg Col. 12 lines 7-12).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. Colucci whose telephone number is (571)-270-1847. The examiner can normally be reached on 9:30 am - 6:00 pm, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571)-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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